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UNITED STATES DEPARTMENT OF AGRICULTURE

FOREST SERVICE

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A PROGRESS REPORT ON

THE TREATMENT OF BLISTER RUST TRUNK CANKERS

ON WESTERN WHITE PINE WITH ACTI-DIONE

ON A PROJECT BASIS

KANIKSU NATIONAL FOREST

1958

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THE TREATMENT OF BLISTER RUST TRUNK CANKERS ON WESTERN WHITE PINE WITH ACTI-DIONE ON A PROJECT BASIS

INTRODUCTION

The antibiotic "Acti-dione" was first tested on white pine blister rust trunk cankers in 1953.[1/] Subsequent work has resulted in the improvement of both chemical formulations and methods of spray application.[2/] Early treatment involved pruning lower limbs; removing bark from inside the margin of discoloration, and applying Acti-dione, with a small paint brush, to the excised surface of cankers. By 1956, tests had definitely established the fact that Acti-dione was 100 percent effective if properly applied to a trunk canker. To facilitate treatment, the small paint brush originally used in applying Acti-dione solution to trunk cankers was replaced by a quart-size compression sprayer.

On the basis of the encouraging results obtained in experimentation, the Kaniksu National Forest blister rust control project established work plans for the 1957 field season for the treatment of trees on a project basis.[3/] Of the 20,000 trees inspected in 6 plantations, 3,500 trees were treated with Acti-dione. Both the excise and slit methods were used depending upon the size of trunk cankers. The Acti-dione stove oil solution was applied by a Hudson compression sprayer of two-gallon capacity.

In 1958, the Kaniksu National Forest expanded the Acti-dione project by treating 135,000 trees in 4 plantations. Until the first of August, the slit method was used in treating unpruned trees. Thereafter, the basal stem spray method was employed. Trees are not examined for infection or bark cut to facilitate spray penetration in this new method. Instead, all potential crop trees are treated whether healthy or diseased providing foliage is of normal color and growth.

It has been found that diseased white pine which can be saved should contain at least one-third the trunk circumference of living bark, and the needles should not be chlorotic or dwarfed.

1/ Moss, Virgil D., 1957, "Acti-dione Treatment of Blister Rust Trunk Cankers on Western White Pine" in the Plant Disease Reporter 41(8), p. 709.

2/ Moss, Virgil D., 1958, "Acti-dione Stove Oil Treatment of Blister Rust Trunk Cankers on Reproduction and Pole Western White Pine" in the Plant Disease Reporter 42(5), p. 703.

3/ Henry J. Viche and Frank J. Kapel., 1957, "A Progress Report on the Treatment of Blister Rust Trunk Cankers on Western White Pine with Acti-dione on a Project Basis" in the Kaniksu National Forest Blister Rust Project Report, p. 10, illus.

METHODS

Areas Selected

Acti-dione work was performed in 4 plantations characterized as follows:

1. Upper Lamb and Bath Creeks. Western white pine was planted in 1941. With over 50 percent infection, fill-in planting would have been necessary to keep area adequately stocked in the future. Accessibility was poor with only one ridge road between the two drainages. Heavy alder patches were common making travel difficult. Area has fair to excellent sites on south and north exposures. Groups of white pine 8 inches in diameter and 30 feet high grow on the better sites. The Acti-dione project was carried out concurrently with ribes eradication work. Both crews used the same standard grid system of lots and lanes, and worked out of the same camp.

2. Pelke. Western white pine was planted in 1954 on a 28-acre clearcut and broadcast burn area. Trees are about 3 feet high. Area contains little ground cover or brush. The plantation is readily accessible by a road passing through the area and is within one-half mile of a forest work center.

3. South Baldy. Western white pine was planted in 1948. On an eastern exposure, area has an elevation of 4,800 feet. Trees average 6 to 8 feet in height. Present stocking is good but stand is about 50 percent infected. The area contains no brush and is easily accessible by road.

4. Cuban Hill. A pure stand of western white pine planted in 1932 lays adjacent to Idaho State Highway No. 57. The stand occupies a moderate to steep north slope at an elevation of 2,400 to 2,800 feet. Present stocking is good except along a ridge where it is very patchy in association with Ceanothus. The 1954 pine disease survey found the plantation was 30 percent damaged by blister rust from heavy infections occurring in 1937, 1941, and 1947.

Operation Procedure

All healthy and diseased crop trees were treated by the basal-stem spray method. This eliminated two steps of the excise and slit methods; namely, (1) examining trees for infection, and (2) treatment of individual cankers. The dragline method and the standard grid system of lots and lanes as in ribes eradication was used in Acti-dione work. Two draglines were laid alternately by a crewman to mark the area as he worked his way across a lane. The mechanical procedure of working an area was as follows:

1. With spray can in hand, a crewman laid out his draglines across a lane. The width between draglines varied from 1/2 to 1 chain depending upon the number, spacing, and size of trees, and the amount of brush.

2. The crewman then worked back between draglines spraying all potential white pine crop trees, healthy or infected, keeping count of the trees sprayed.

3. Upon completing a strip, he recorded the number of trees sprayed in his lot report book; filled spray can if necessary from a 5-gallon jeep can kept abreast with the crewman's progress, then moved to next unworked strip and continued above procedures.

Basal Stem Spray Method

In applying Acti-dione solution from opposing sides of a trunk, the nozzle of the spray pump is held 12 to 18 inches from the tree to wet the basal portions of trunk and branches. Basal portion of lower branches are wet 18 inches from axils. Trees 10 feet or less in height are sprayed from base to 1/3 their height. Trees over 10 feet tall are sprayed to a height of about 5 feet but not exceeding 1/3 the crown length.

Records

The lot report used in ribes eradication work is adaptable for Acti-dione treatment. The crewman records the number of trees treated by drag, man-hours, and gallons of chemical (Figure 1). This information is then transfered to the lot map (Figure 2).

Figure 1. Sample Lot Report

M-1911-R1

LOT REPORT

Crewman John Doe Lane 11 Lot 7

ERADICATION

Date	Hrs.	TREES ~~Lac.~~	Vis.		Wrk.
9-2	6	654			
Total	6	654			

Checker

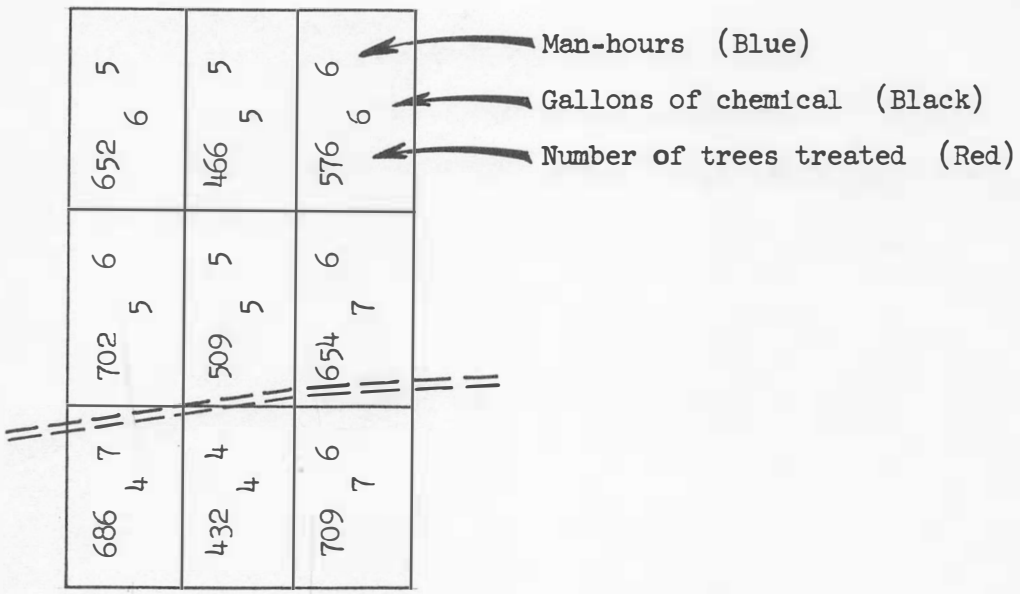
CHECKING

Date	Lac.	Vis.		Check
Total				

Gallons Chemical 7

STR. NO TREES	RIBES LOCATION
	Working South
102	
103	
95	=========
205	
149	
	complete

Figure 2. Sample of Lot Map



L E G E N D

═══════ Secondary road

B A T H C R E E K

S34 T36N R45E

Age Class 1941-50

Figure 3. Shows premature casting of needles from western white caused by Acti-dione spray from basal stem treatment made in June. Picture was taken the following October.

Figure 4. Canker four months after treatment with Acti-dione by basal stem spray method. Note sharp contrast between dead canker and surrounding live trunk bark.

Figure 5. Shows canker dead one year after Acti-dione treatment. Note dead bark cracking at base of trunk from constriction and new wood invading canker area.

Figure 6. Shows canker two years after Acti-dione treatment. Note new wood callusing around scar perimeter.

RESULTS AND DISCUSSION

Acti-dione treatment of western white pine stands to preserve adequate stocking from trees infected by blister rust must be done on a priority basis Basic factors in determining stand priority are:

1. Age of stand.
2. Amount of infection.
3. Time until stocking is seriously reduced by the rust.

Small diameter trees are killed more quickly by rust than large diameter trees. Young stands, therefore, need earlier treatment than older stands to maintain adequate stocking. However, immature merchantable timber will yield a higher return on the cost of Acti-dione treatment because of earlier harvest.

The efficiency of the Acti-dione program has increased greatly since the introduction of the basal stem spray method of treatment compared to the older excise and slit methods. The newer method of application kills bole cankers in all sizes of immature western white pine as effectively as the excise and slit methods. All potential white pine crop trees were treated by the new method for the following reason:

All crop trees in a stand can be treated at less cost than if only diseased crop trees are treated because searching time in examining trees for infection is eliminated. As proof, table 1 shows there were 75 trees treated per man-day by the slit method compared to 458 trees treated per man-day by the basal stem spray method in the Upper Lamb Creek and Bath Creek Plantation; and the slit method required 1.17 man-days per acre compared to 0.79 man-days per acre by the basal stem spray method.

Cost of the Acti-dione treatment has also been reduced by the introduction of the basal stem spray method. Again using the Upper Lamb Creek and Bath Creek Plantation as the largest example, the total cost per treated tree was $0.195 by the slit method compared to $0.045 by the basal stem spray method; and the total cost per acre was $17.00 by the slit method compared to $14.46 by the basal stem spray method.

In the past there has been a great deal of trouble with pumps clogging and parts wearing out. This has resulted in loss of much working time. Daily production could be increased if a trouble-free spray pump was available.

As the Acti-dione program expands, one man using 8 to 10 gallons of chemical each day will present a field supply problem. This problem will require the utmost in planning to get the job done efficiently on all types of areas.

For large-scale programs, the Acti-dione stove oil solution should be mixed in large quantities to facilitate supplying the workers. It would, therefore, be advantageous to obtain the Acti-dione concentrate in large containers.

The Acti-dione solution causes premature casting of the second and third year needles. However, this makes for better natural pruning and reduces needle target area for subsequent blister rust infection.

Table 1. Results of the Acti-dione treatment on western white pine in the Kaniksu National Forest during 1958 using the slit and basal stem spray methods. Cost figures are based on a wage rate of $14.00 per man-day and $0.835 per gallon of solution. * Proportion of trees treated to trees inspected and treated.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Location and Age Class	Method of Treatment	Number of Trees Treated	Man-days	Acres	Gallons of Chemical	Trees Treated Per Man-day	Man-days Per Acre	Trees Treated Per Gallon of Solution (4 oz. Acti-dione to 10 gals. Stove Oil	Number of Trees Treated Per Acre	Gallons Per Acre	Labor Cost Per Treated Tree	Chemical Cost Per Treated Tree	Total Cost Per Treated Tree	Labor Cost Per Acre	Chemical Cost Per Acre	Total Cost Per Acre
Upper Lamb Creek and Bath Creek	slit	*23,260 / 43,064	312	266.5	195	74.6	1.17	119.3	87.0	0.73	$0.188	$0.007	$0.195	$16.39	$0.61	$17.00
Age Class 1941-50	basal	66,374	145	183.0	740	457.8	0.79	89.7	362.7	4.04	0.036	0.009	0.045	11.09	3.37	14.46
Pelke Age Class 1951-60	basal	10,744	13	28.0	64	826.5	0.46	167.9	383.7	2.29	0.017	0.005	0.022	6.50	1.91	8.41
South Baldy Age Class 1941-50	basal	5,053	7	6.3	63	721.9	1.11	80.2	802.0	10.00	0.019	0.010	0.030	15.56	8.35	23.91
Cuban Hill Age Class 1921-40	slit	* 1,500 / 1,850	25	40.0	18	60.0	0.62	83.3	38.0	0.45	0.233	0.010	0.243	8.75	0.38	9.13
	basal	28,163	89	135.1	5	316.4	0.66	63.3	208.5	3.29	0.044	0.013	0.057	9.24	2.75	11.99
Total slit		24,760	337	306.5	213	73.0	1.10	116.	81	.69	0.191	0.007	0.198	15.40	0.58	15.98
Total basal		110,334	254	352.4	1,312	434.0	0.72	84.	313	3.72	0.035	0.010	0.045	11.09	3.03	14.12
Grand Total		135,094	591	658.9	1,525	229.0	0.90	88.5	205	2.31	$0.064	$0.009	$0.073	$13.10	$1.89	$14.99

SUMMARY

Many advances have been made in methods of applying Acti-dione to western white pine infected by blister rust since first testing this antibiotic in 1953. These advances have been responsible for treating an increasing number of trees each year. On the Kaniksu National Forest in 1958, over 110,000 western white pine trees on 350 acres were treated by the basal stem spray method.

Average cost by the basal stem spray method was 4.5¢ per tree and $14.12 per acre. Cost of treatment was proportional to the size of trees, accessibility of area, amount of ground covered, and number of trees per acre.

Stands within blister rust control units needing Acti-dione treatment, to preserve adequate stocking, should be worked on a priority basis.

The Acti-dione program has possibilities of saving many blister rust infected western white pine stands which would otherwise be lost. Also, long-term protection of stands may result if the antibiotic immunizes trees against new rust infection. This phase of disease prevention is being currently studied.